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RETROACTIVE AMNESIA: ILLUSTRATIVE CASES AND A TENTATIVE EXPLANATION.

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The German philosophers, Fries and H. Schmid, taught that not the persistence of ideas which have always been in consciousness but the forgetting of them requires special explanation. Sir Wm. Hamilton, who had no patience with physiological explanations of memory, maintained the same. Not memory but forgetting is the mystery. Modern science takes a different view and yet in the phenomena of amnesia it finds the most promising opportunity for the study of the conditions of memory. Specially interesting are those cases resulting from shock or disease where the forgetfulness extends to events preceding the cause of the amnesia. Such cases may, for convenience, be divided into two classes, cases of retrograde amnesia and cases of retroactive amnesia. In the former class I shall include those cases where memory is obliterated for a relatively long period preceding the immediate cause of the amnesia, and in the latter those cases, usually the result of shock, where the amnesia extends to only a short period, a few minutes or a few hours, immediately preceding the accident.

The purpose of this paper is to present one or two cases of retroactive amnesia and suggest a tentative explanation; but first a brief discussion of retrograde amnesia and kindred phenomena may be helpful.

THE PHENOMENA OF DISSOCIATION.

Everybody, perhaps, has had the experience of trying to recall a forgotten name; the vague glimmer of it haunts us; we know it is there, but we cannot get it; for the time being it is dissociated from our dominant train of thought; but the proof of our possessing it is furnished later on when it comes, perhaps spontaneously, into consciousness. Equally common, perhaps, is the experience of planning to do something,—to attend to

some errand, or perform a minor duty, or the like—and then in the multitude of cares forgetting what was to be done. The tantalizing feeling of knowing that we ought to do something and of not knowing what it is persists. Here again the thing forgotten is merely dissociated from our present train of thought. A mere change of scene or diversion for a few minutes may be quite enough to give us the cue and bring it back again to memory. Still again upon going to a new place and entering upon new duties we frequently forget such a large part of the routine details of our former life that we seem for the time being almost different personalities.

All these familiar experiences are simple forms of dissociation. The following is more rare and on the border line probably of the pathological. The case is reported by a professional man who had been suffering for some months from overwork and probably nervous disease as well. I give it in his own words:

"You have often experienced the sensation of *oldness* instead of *newness* when in a strange place—that is, the feeling that you had seen the same before. Did you ever have the converse of that feeling? It has happened to me several times of late. Objects the most familiar all at once seemed wholly strange and altogether unrecognizable as never having been seen before. One morning while on my way to the city I left the house and walked toward the place where I was to take the street car, a distance of four short blocks, a route traversed by me almost daily since I returned from——, and one quite familiar to me before I went away. I walked along absorbed in thought when I suddenly found myself in a strange place. I looked ahead, to the right and to the left, and then turned and looked back, but in no direction could I see anything I had ever seen before. I walked back to the street I had last crossed and looked up and down it but could see no familiar object. I then retraced my steps to the place where I had first stopped and looked about as before with the same result. Still it did not seem possible that I could have gone astray, as I could not have found strange ground by following the street I had started on without going a considerable distance, and I did not think I had been walking more than two or three minutes,

and I did not think I had turned from that street. As there was nothing in sight which I could recognize I tried to recall the looks of the houses on my usual route and to compare them with those in sight, but I could not visualize them sufficiently to make a comparison. I, however, remembered a church which if I were on the right road should be about a block away on my left, with an open square between me and it, and I looked for the church. There appeared a church just where I should have located it but it was one I had never seen before. I stood and studied it critically and analyzed its appearance, its size, color, shape and proportions, and though I scrutinized each part I could have sworn that I had never seen it before. I concluded to go on, and did so, coming to a street with car-tracks within less than a block, but there was nothing familiar, in fact nothing I could recognize as having seen it before. I waited till a car came along and read on it the sign of the line of cars I was accustomed to take and so boarded the car and got safely to the city. I have since that had the same feeling several times in the city and once while on the car I was so certain that I had taken the wrong car, or gone too far, from the strangeness of everything I saw through the car windows, that I stopped the car and got off finding myself in an utterly strange place. I tried to find my location by reading the names of the streets on the corners but could not find the signs, so I inquired at a saloon at one corner the names of the intersecting streets and found it was a corner I had stopped at at least a hundred times. I was not in the least excited on either of these occasions but the first time I was very much surprised. May not such an experience, with concurrent loss of memory, account for some of the instances where people go away from home, disappearing suddenly, and finally turning up after extended travels with no recollection of going away?"

Such phenomena of dissociation vary from the simple and familiar experiences first mentioned through all degrees of elaboration and complexity up to the well-marked cases of double personality reported by Azam, Prof. James and others. Dr. White of the State Hospital at Binghamton, N. Y., has

recently reported a case¹ which illustrates very well the gradual development of such phenomena of dissociation from the simplest forms up to a clear case of secondary consciousness. The following is an abstract of his detailed report:

J., girl, aged 14. Lost both parents in infancy, mother died in a hospital for the insane, brought up with a brother and two sisters much older than herself. Apparently normal to age of ten. Puberty came then with radical change of character, became quiet and sedate, but continued successful at school. When 11½ she heard from the lips of a neighbor the gruesome details of a suicide. That night the thought came to her,—what would her folks think if she killed herself. Her brother spoke crossly to her that evening, and she went to bed to cry and dream of the suicide; but she was soon awakened by the slamming of the door and her brother's footsteps and heard him ask: "Is she dead?" Then her brother locked the door and went away leaving her in the house alone. Frightened and crying, she walked the floor and feared that her sister was dead, and the desire to kill herself first came into her mind. Later she learned that her cousin had been run over by a train, but she continued to worry, however, until her sister returned at 2:30 A. M.

During the next year or more she forgot the old woman's story, but the idea of suicide remained, and she would frequently say, "Well, maybe you will be sorry, I shall kill myself." Then she had trouble with her brother and the idea of homicide was suggested. A year later she became attached to a young man and was bitterly opposed by her family friends. Trouble with her eyes and headaches ensued. Soon after she made several abortive attempts at suicide. While in this condition one evening she attended a party where a young man shot himself, and she heard the shot and saw the body. After one or two other unfortunate events and several unsuccessful attempts at suicide, she had la grippe, and on recovering, fell, striking her head severely and remaining unconscious most of the time for several days.

"During all this time," continues the report, "she acted

¹Sidis, Boris: *Psychopathological Researches*, New York, 1902, pp. 125-158.

strangely, often did not know where she was or recognize those about her. On the third day of the attack she was taken home, and on the afternoon of the fifth day suddenly came to herself, with absolutely no recollection of what had occurred. The last thing she remembered was lying on the sofa in her aunt's house at N. From then on everything was a blank, even her journey home having left no trace in her memory.

"This was her first attack of what we shall hereafter call her secondary state, a condition from which she rallies with absolutely no recollection of the events that occurred during its ascendancy."¹

Such was the patient's condition when admitted to the hospital. She suffered from well-developed suicidal obsession and erythrophobia and was easily hypnotizable. After treatment for six months she was permitted to leave the hospital on August 29, 1901, on thirty days' parole. On September 28, 1901, she was discharged. "Since that time" says Dr. White, "I have been in constant correspondence with her and have every reason for believing that she is perfectly well in every way."² The method of treatment I give as reported in Dr. White's own words:

"The principle followed in this case was that of bringing together,—reassociating—what had become dissociated: synthesis of the dissociated subconscious states. All the details of the events for which the patient was amnesic were thoroughly traced by use of hypnosis and hypnoidization, and were then united to her upper, personal consciousness, so that she is now in full possession of all the facts. These facts, obtained from her in this way, were subsequently verified by numerous conversations with different members of her family.

"It is noteworthy in this connection, that all of her acts and sayings which had previously seemed to have no foundation in reason, but, on the contrary, had every appearance of being quite incoherent, could be traced in each instance to an adequate cause, and thus what appeared as chaos on the surface was reduced to order."³

¹ *Loc. cit.*, p. 146.

² *Loc. cit.*, p. 156.

³ *Loc. cit.*, p. 153.

The one distinguishing characteristic of cases of dissociation is that ideas forgotten are potentially related to consciousness, directly, perhaps, to a secondary or subliminal consciousness, indirectly to the dominant consciousness. By means of hypnotism, of change of environment, or some other means, they may be revived, and usually may be brought into association with the dominant consciousness. Many cases of so-called retrograde amnesia are of this class or closely related to it. Not all, however, are to be classified in this way. In many cases the memory is hopelessly obliterated.

RETROGRADE AMNESIA.

Although the usual method of classification of amnesias is unsatisfactory, I have no intention of attempting here any rigid classification, and would only say that the essential characteristic of cases of retrograde amnesia as distinct from phenomena of dissociation is that in the former case ideas of a certain modality (as in aphasia) or all those relating to a considerable period of the patient's life are obliterated, and for a relatively long period at least, cannot be revived by psychological methods.

It is often very difficult to determine whether the amnesia is a case of dissociation or not. Many of the cases of retrograde amnesia usually cited and those that have been reported to me seem to be at least closely related to the phenomena just described. The following case, the account of which I owe to Dr. Everett Flood of the Massachusetts Hospital for Epileptics, Palmer, Mass., shows this close relation of these two forms of amnesia.

"N. B. F., male, age 60. Patient has had the ordinary diseases of childhood. He has had epileptic convulsions since he was seven years old. He had been confined in Northampton Insane Hospital for about twenty years preceding Feb. 25th, 1902, when he was transferred to the Massachusetts Hospital for Epileptics.

"His father and mother both died of pneumonia, had one sister who was insane. Patient's present condition seems somewhat demented. He complains of having a poor memory, and is just recovering from an attack of muscular rheumatism,

and is somewhat emaciated, due to recent exposure and improper care.

"Nov. 11, 1902, patient escaped from this hospital and no trace of him could be found until Jan. 10, 1903, when a letter was received stating that he was at the Poor Farm in the town of Sturbridge, Mass. A physician and nurse from the hospital went to Sturbridge to bring patient back. Patient failed to recognize either the physician or the nurse and stated that he had never been in the Hospital for Epileptics. He did not remember having his eyes treated there or assisting in breaking the steers (an occupation in which he was quite expert). He did remember, however, having been in the Northampton Insane Hospital and of working on the farm there. His memory seemed to be entirely obliterated for a period of two hundred and sixty days, between Feb. 25th and Nov. 11, 1902.

"He did not know that his name was Fisk; but said it was Stebbins. He could talk quite rationally about what had occurred since he left the hospital. He said that for a time he was peddling books; although he could not remember the name of the man by whom he was employed. After that he worked on a farm until within three days before he was taken to the Poor Farm. The master of the Poor Farm stated that the patient told him that he was walking along the road, when a man whose name was Kelly came along with a team, and patient applied to him for work. Mr. Kelly took him into his team and carried him to Sturbridge, where he employed him selling books for a time.

"After patient was brought back to the hospital, he was quite weak for several days; but the loss of memory, which remained for a few days, gradually began to clear up, and at the present time he knows the names of the nurses and of each of the buildings.

"When asked to try to remember how he left the hospital, he stated that he found himself on a rock out in a field and that he got up and walked along in the road quite a distance, when a man with a team came along with whom he got a ride.

"The cook in the kitchen where he was employed previous to his escape, stated that he had acted strangely for a day or two before he ran away. It is very probable that this was a

pre-epileptic confusion, and that the morning of his escape he had a convulsion, and when consciousness returned he was out in the field on the rock.

"The chief points of interest are the confusion, which probably preceded a convulsion, and the total amnesia, covering a period of 260 days, which gradually disappeared when patient was returned to his familiar surroundings."

The following case of a very different character has been reported to me by a student:

The case is that of a young lady, age 17, rather mature for her age. She reports that she had fever (perhaps typhoid) at 3 years of age, spinal meningitis at 7, and diphtheria at 9. "In the spring of last year" (1902), she writes, "while attending the University I became exhausted through over-work. One afternoon when returning home something seemed to snap in my head and it went whirling. This itself is clear in memory, but how I got home and what happened in the next three days or in the whole preceding month are forgotten. Of course from what has been told me I know now about what did happen but it is still impersonal as a story. I have no memory of the lessons we studied, and though during the time I was sick and before it I wrote verses constantly, I do not know them now or recognize them as my own work. At the time age seventeen."

At present, she reports, that her health is good although not as good as before the experience of amnesia mentioned. In the spring her memory is rather poor, she can hardly remember things from one day to the other. This is due, she thinks, to the fatigue of the year's work; at other times her memory is unusually good.

Other interesting cases, notably that studied some ten years ago by Dr. Dana,¹ and the one recently reported by Dr. Cowles,² are accessible in current medical and psychological literature.³

¹Dana, Charles L.: *The Study of a Case of Amnesia or 'Double Consciousness.'* *The Psychological Review*, Vol. I, 1894. New York, pp. 570-580.

²Cowles, Edward: *Epilepsy with Retrograde Amnesia. A Medico-Legal Study of the Case of Amos D. Palmer.* *American Journal of Insanity*, Jan., 1900. pp. 593-614.

³See also Sidis, Boris: *Psychopathological Researches. Studies in*

RETROACTIVE AMNESIA.

The study of amnesia shows the great complexity of the problem of explanation, but it is helpful at the outset to have a simple preliminary hypothesis. This should be held tentatively, but the advantage of it is that it may save us from seeking unnecessarily for a complicated theory. Such a simple tentative hypothesis is here offered for those cases of backward-working amnesia which do not fall under the classes already mentioned, namely, for the cases where the amnesia extends to a few minutes, or at most a few hours preceding the cause of it, and to which I would limit the use of the term retroactive amnesia. That such cases stand in a class by themselves has been noted by Ribot.

"Temporary amnesia," he writes, "is also frequent in cases of cerebral excitement, and then represents a *retroactive* character, that is to say, the patient, when recovering from unconsciousness, has lost not only the recollection of the accident he met with (fall from a horse or a carriage, blow on the head, etc.,) but also the recollection of a more or less long period of his life *before* the accident. Dr. Frank Hamilton has reported twenty-six cases of this kind, which he communicated to the Medico-legal Society of New York (1875) and upon the forensic importance of which he lays stress. According to his opinion amnesia of events *before* the cerebral shock may extend over a period varying from five minutes or more to two or three seconds. It seems, therefore, that in order that a recollection may organize and fix itself, a certain time is necessary, which in consequence of the cerebral excitement does not suffice."¹

The following cases will serve as illustrations of this form of amnesia. The first is reported to me by Dr. Douglas Graham, of Boston, and I give it in his own words.

"One evening in Oct., 1900, at 9:15, I found myself in bed with my head sewed up. I asked my wife how I came there and what had happened. She said I was knocked down by a 'scorcher' and brought home in an ambulance by two police-

Mental Dissociation. New York, 1902, pp. 329. Also papers mentioned in the bibliography at the end of this article.

¹Ribot: Article on Memory, in Tuke's "Dictionary of Psychological Medicine." pp. 799.

men three hours before. A few minutes before that I had a confused recollection of people moving about my room and raising my arm,—the doctor took my temperature—and of trying to remember what had become of my accident policy.

“I have a dim recollection of getting off the car about ten minutes before I was knocked down by the bicycle. Then there was an absolute blank for about three hours.

“I asked my wife how I seemed when the policemen brought me into the house. She says I walked from the ambulance with a policeman on each side of me—steadyng me—and that I was very profuse in my thanks for their assistance, declaring all the time that there was nothing the matter with me.

“Three days after I called on the policemen and asked them how I appeared when they first found me. They said I was sitting on the sidewalk with blood running down my face, and they asked me if I could walk home— $\frac{3}{4}$ mile—I replied *no*, and I then asked them, who are you? who are you? like a drunken man. (I never was drunk in my life.)

“The bicycle struck me on the right hip and did no harm there; but there was a scalp wound 3 or 4 inches long over the left parietal bone. So I must have been knocked down like a ten pin, and turned a sort of somersault. When the doctors were sewing my scalp I asked them, Why don’t you use cocaine? Why don’t you use cocaine?

“Next day I was out with my head sewed up and felt unusually quiet, cool and collected in my upper story,—whether as a result of the bromide or the blow I cannot tell. I was disposed to think that the vigorous percussion or concussion acted as a powerful sedative—both at the time and after, not altogether in a harmful way.

“The following day—36 hours after the accident—I went to my office in Boston and attended to my duties as usual. I live in Brookline.

“It was almost worth the experiment to learn that I am such a hard-headed Scotchman, though I do not care to repeat it for that purpose.

“I am now 55 years old—weight about 150 pounds, of a rather nervous temperament, and enjoy pretty good health.”

I add one more case reported to me a few years ago by a physician; but I cannot obtain the details nor vouch for it, as

the original report was mislaid; but even if imaginary, I think the account is typical and so worth giving.

A farmer spent his morning in his usual vocations. Then he shelled some corn, afterwards worked in his garden, then harnessed his horse and took a ride for a mile. At the end of this ride, he was thrown from his wagon and seriously injured his head. He remained unconscious for some time, and then when restored remembered the work of the early morning, dimly recalled the shelling of the corn, but remembered nothing of what occurred afterward.

How shall we explain such cases?

The theory I have to present is a very simple one. It has not been elaborated by any one so far as I know; but Ribot in the passage cited above suggests a similar view, and it is in harmony with our general knowledge of the physiological conditions of mental activity. It seems well at least to test a simple theory of this kind before resorting to anything more complex. It is briefly as follows: The fixing of an impression depends upon a physiological process. It takes time for an impression to become so fixed that it can be reproduced after a long interval; for it to become part of a permanent store of memory considerable time may be necessary. This we may suppose is not merely a process of making a permanent impression upon the nerve cells, but also a process of association, of organization of the new impressions with old ones.

During our ordinary life, as we may suppose, the physiological processes upon which the permanency of our impressions depends are continually going on. Hence, at any given moment some of our impressions received in the near past, say during the last twenty-four hours, are completely organized; others are nearly organized; others are partially organized; while still others have just been received. The time required for this process of organization may vary with different individuals and different conditions, but in all cases it seems to be necessary.

Now suppose a shock occurs which arrests these physiological processes in the nervous tissue. What will be the result? Not only will the mind be a blank for the period of insensibility following the shock, but no impressions will be remembered which were not already at the time of the accident suffi-

ciently well organized to make their persistence for a considerable interval possible. Hence, the amnesia will be "retroactive." Events immediately preceding the accident are entirely forgotten. This is illustrated in the case of the farmer cited. The mile ride, harnessing the horse, working in the garden, the events immediately preceding the accident are entirely forgotten. Others, that occurred earlier, such as shelling the corn, are dimly remembered; and only events preceding this are clearly recalled.

On the mental side an important factor in fixing an impression is probably the automatic repetition of it. This is seen in the case of people who think audibly, repeating words that they have heard; perhaps especially in the case of children; but where there is no such motor expression, nevertheless an automatic repetition of the idea very likely occurs. Now this mental process, as well as the correlative physiological processes involved in the fixing of impressions, are, we may suppose, arrested by the shock which destroys consciousness.

The second important factor on the mental side is the process of association, of linking the new with the old. This process of associative memory is perhaps the most fundamental fact in our whole psychic life. It has aptly been compared by Zanotti and Hume to the law of gravitation in the physical world. It is this that makes it possible to profit by experience. The possibility of this marks the first grand division in psychic evolution. Now great fatigue, excitement, unconsciousness, and narcosis arrest in varying degrees this process of association.

We do not know the nature of the physical processes correlated with these psychic acts of automatic repetition and association, but evidently time is required for them; and if the ideas in question are to become a part of the permanent store of memory, considerable time is needed. If these psychological processes of repetition and association and the corresponding physical processes are arrested by excitement or the like, then, as has been shown, we should expect to find the amnesia retroactive.

The essential characteristic of these cases of retroactive amnesia is that the memory is lost because it was never fully organized.

The amnesias of epilepsy are among the most common cases

of retrograde amnesia. They appear to vary greatly in character, all of the classes we have distinguished occurring. The study of them seems to corroborate the hypothesis here presented.

"Alzheimer, in an article on retrograde amnesia in epilepsy, refers to the numerous reports in the literature showing that after traumatism and hysterical attacks, a lapse of memory for a more or less protracted period preceding the traumatism or the attack may occur; this retrograde amnesia may be confined to individual acts, or a few hours, or it may comprise days and months; and, as it seems, it may sometimes take in the whole preceding life." He discusses also the retrograde amnesia occurring in conjunction with epileptic paroxysms.

"Alzheimer's cases were (1) a patient who had after attacks two retrograde lapses of memory; one that extended over four weeks and cleared up after one week's duration; the other covered a year and a half before the attack, and memory began to return about three weeks after it; (2) a patient whose amnesia extended over a week previous to a series of attacks occurring in three days, and cleared up twenty-one days later; (3) a patient who had a series of attacks within six days followed by an amnesia that extended back two weeks before they began, and which cleared up three weeks after the attacks."¹

Some of these cases referred to by Alzheimer are apparently cases of dissociation; others are cases of retrograde amnesia proper; others are perhaps of the kind we are now considering. He notes that the memories of the time of the paroxysm are "dream-like, indefinite, and incomplete," while those lost by retrograde amnesia are, when revived, "sharp, clear, and definite." This is precisely what we might expect, the former having never become really permanent memories because the processes or organization were interfered with by the paroxysm. And Fétré has noted that different forms of amnesia may occur in the same patient and that the retroactive amnesia in several cases has seemed to vary with the severity of the attack.

Again "It is admitted," writes Dr. Cowles, "that uncon-

¹Allg. Zeitsch. f. Psychiatrie, LIII, pp. 483. Cited from résumé by Cowles, Edward: Epilepsy with Retrograde Amnesia. American Journal of Insanity, Jan., 1900, pp. 606, 607.

sciousness is a fundamental characteristic of epilepsy, and, as a rule, that the epileptic does not retain a single recollection of the acts performed during the impulsive crisis; but it appears sometimes that the patient is fully conscious of the acts he commits and remembers them. . . . The memory may also be patchy, with obscure and dream-like recollections, more or less clear and prolonged, of single acts or occurrences while in the epileptic state.”¹

These apparent exceptions do not necessarily impair the truth of our hypothesis. Whether a certain degree of shock shall be sufficient to destroy certain memories or not, will depend upon the condition of the patient and the strength with which the given impressions were primarily fixed. Some impressions may have been attended to so intensely that they persist in spite of the shock.

Probably many cases of amnesia in epilepsy are of a mixed type. The interesting case (referred to above) studied by Dr. Cowles, for example, seems to me of this kind. It is doubtful if it can be explained, except in part, by the hypothesis here presented.

If this theory be true, it has great pedagogical suggestiveness. In pathological cases we see in simpler form the same processes that occur in normal memory.

There must be time for the processes of organization and assimilation to take place. This is further emphasized by the results found by Ebbinghaus. In learning his nonsense syllables, a given number of repetitions at one sitting was not nearly as effective as the same number of repetitions divided into several sittings. There must be time for nature to do her part. Without appealing to any mystical form of mental or cerebral activity it is clear that a night's sleep may be more effective in fixing a lesson in the memory than continued repetition. Hurry defeats its own end.

CONCLUSIONS

The following conclusions are suggested by this preliminary study:

1. The cases of amnesia due to shock or the like, where the

¹ *Op. cit.*, p. 605.

loss of memory extends only to a relatively short period preceding the cause of it, stand in a class by themselves and are to be distinguished, on the one hand, from cases of dissociation where it is possible by psychological methods to revive the forgotten memories, and, on the other, from cases of retrograde amnesia proper where memory is obliterated. To this class the term retroactive may conveniently be limited.

2. In normal memory a process of organization is continually going on,—a physical process of organization and a psychological process of repetition and association. In order that ideas may become a part of permanent memory, time must elapse for these processes of organization to be completed.

3. In cases of retroactive amnesia, as we have defined the term, the amnesia results from arrest of these processes of organization by shock or other cause. The memory is lost because it was never completely organized.

4. In normal memory these processes of organization are essential in order to fix impressions, and anything that interferes with them,—fatigue, hurry, distraction or excitement, hinders aquisition.

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